628.96909786
A7CEE

MONTANA DEPARTMENT OF AGRICULTURE
ENVIRONMENTAL MANAGEMENT DIVISION
TECHNICAL SERVICES BUREAU
HELENA, MONTANA 59620

Comparative Efficacy, Economy and Nontarget Hazard of Baiting Richardson Ground Squirrels on Ground Surface and Inside Burrows.

by:

Monty Sullins
Rodent Control Specialist

ABSTRACT

A field study was conducted in April and June, 1982, in Fergus and Meagher Counties, Montana, to compare surface baiting with strychnine grain bait to baiting inside burrows for controlling Richardson ground squirrels. Down-the-burrow baiting was found to be less efficacious, required more time and did not reduce potential nontarget hazards. No nontarget mortalities were observed.

Technical Report 82-3

September, 1982

Montana State Library
3 0864 1006 8553 9

INTRODUCTION

Consumption of surface applied grain bait by nontarget species, especially granivorous birds, upland game birds and waterfowl has long been a major concern of field rodent control programs. Techniques such as altering grain bait shape (eg. steam rolling) and color (dyeing) have been used to help reduce nontarget poisonings. The effectiveness of these measures is often questionable and may offer only a partial solution. Accidental waterfowl poisonings from rodent control operations in Montana in 1981 indicated that additional precautions, if available, are needed. The U.S. Environmental Protection Agency (EPA) is currently considering restrictions or possible cancellation of surface applied strychnine rodent baits because of hazard to nontarget species (U.S. Environmental Protection Agency, 1980).

An alternative application method often suggested is placement of bait down rodent burrows. This would obviously reduce the amount of bait present as a direct food source for birds, livestock and other animals. However, such bait application would be much more labor intensive, requiring careful manual placement at each burrow entrance. This may be impractical when treating large acreages infested with ground squirrels. Most pest rodent species (except pocket gophers) feed primarily on the ground surface and may not readily accept bait placed in burrows. Tietjen (1976) found baiting down burrows with zinc phosphide to be ineffective for controlling black-tailed prairie dogs.

However, documented data comparing efficacies and economic factors of surface and doe-the-burrow baiting with strychnine grain bait are not presently available. Since baiting in burrows is a requirement currently being considered in areas adjacent to waterfowl habitat in Montana, it is essential to obtain such comparative data.

OBJECTIVES

The objectives of this project were to compare efficacies of surface and down-the-burrow baiting with strychnine grain bait for controlling Richardson ground squirrels, to monitor effects on nontarget species, to determine amounts of residual bait left after baiting operations and to compare time required for bait application.

METHODS

Two study areas were chosen for this project - one near Moore, Montana, in Fergus County and the other near White Sulfur Springs, Montana, in Meagher County. The study was divided into 2 time periods to coincide with optimal bait acceptance by Richardson ground squirrels. The Moore study area was treated April 23 through May 3 and the White Sulfur area June 28 through July 7, 1982. Four plots on each study area received surface and down-the-burrow baiting treatments (2 replications each) with strychnine grain bait (Sebesta's 0.44%, EPA Reg. No. 46135-2_.

Calibrated dippers (1 teaspoon of bait) were used to scatter bait on the ground surface near burrow entrances or down the entrance of each burrow. A fifth plot on each study area received no treatment and was used as a control. Counting sites within each treated and control plot were monitored using plugged hole counts to determine pre and post treatment activity indices for target rodent species. (Vegetative growth prevented use of direct visual observations.)

Fifty well used burrows were randomly selected, flagged and plugged with cow chips 3 days before and after bait application. The plugged holes were again observed for reopening 2 days after plugging. Pre and post activity indices were used to determine percent reduction in activity by the formula (Matschke, 1979).

$$\text{Percent Reduction} = 1 - \frac{\begin{array}{c}\text{Percent holes reopened}\\ \text{post treatment}\\ \text{(treated plots)}\end{array}}{\begin{array}{c}\text{Percent holes reopened}\\ \text{pre treatment}\\ \text{(treated plots)}\end{array}} \text{ X } \frac{\begin{array}{c}\text{Percent holes reopened}\\ \text{pre treatment}\\ \text{(control plots)}\end{array}}{\begin{array}{c}\text{Percent holes reopened}\\ \text{post treatment}\\ \text{(control plots)}\end{array}} \text{ X } 100$$

Time required to apply each bait treatment was recorded in man hours (number of men applying bait X time in hours). Baiting time was recorded both on a per acre basis and as time required to apply 1 pound of bait.

Digitized by the Internet Archive
in 2017 with funding from
Montana State Library

https://archive.org/details/comparativeeffi1982sull_0

Residual bait left after baiting operations was recorded as the number of bait kernels counted near 25 burrow entrances on each treatment plot 72 hours post treatment.

Target and nontarget carcass counts were made by visual observation along 5 transects on each treated plot 24 and 72 hours post treatment.

RESULTS

The results from the two study areas are summarized in the following table:

No unusual conditions occurred on the control plots and no nontarget carcasses were found after baiting on any of the plots.

DISCUSSION

Efficacy of the baiting treatments was variable and difficult to explain for all plots. Ground squirrel activity was reduced much less (range: 84.4 - 7.5%) than a desired 90% or greater (Marsh, 1967). The Moore study was originally scheduled in early March shortly after the squirrels emerged from hibernation, while they were actively breeding and before the vegetative green-up. However, cold, snowy weather delayed the study until green vegetation was abundant. Preference by the squirrels for the green vegetation may have adversely affected bait acceptance.

	MOORE STUDY AREA				WHITE SULFUR STUDY AREA			
	Surface Baiting		Down-the-Burrow Baiting		Surface Baiting		Down-the-Burrow Baiting	
	Plot 1	Plot 2	Plot 1	Plot 2	Plot 1	Plot 2	Plot 1	Plot 2
Efficacy (% reduction in activity)	84.4	31.8	72.7	52.3	46.0	11.8	27.1	7.5
Time required to apply 1 pound of bait (manhours)	.31	.31	.55	.58	.37	.44	.62	.46
Baiting time per acre (manhours)	.14	.16	.23	.22	.20	.18	.43	.17
Bait required (lbs./acre)	.44	.52	.42	.38	.53	.42	.69	.38
Ground squirrel carcass count (24 hours past treatment)	5.0	1.0	6.0	1.0	25.0	8.0	8.0	2.0
Residual bait count (mean kernels per 25 burrows)	92.5	92.4	11.1	13.4	41.3	67.8	6.4	8.3

Young-of-the-year had also been born and several live juvenile squirrels were seen at burrow entrances post treatment. Unweaned young may have not consumed bait but still have effected plugged hole counts. Above normal precipitation occurred in central Montana during April through June, resulting in abundant and above normal amounts of vegetation throughout the summer months. This may have adversely affected bait acceptance during the White Sulphur study. Vegetation height prevented the use of visual observation so an alternate means of determining reduced squirrel activity. Carcass counts indicated that ground squirrel mortality was probably greater than the plugged hole census indicated. Regardless of poor efficacy, there was a general trend for better control on plots that were surface baited compared to paired plots baited down-the-burrow.

Time required to apply one pound of bait averaged 0.36 manhours on the scattered baited plots compared to an average of 0.55 manhours on the down-the-hole baited plots. The resulting 0.20 manhour increase in time required for down-the-burrow baiting may become significant when treating large acreages or in a commercial application.

There was no substantial difference in the amount of bait applied in the two treatments.

Down-the-hole baiting did not reduce the number of ground squirrel carcasses found on the ground surface. One surface

baited plot had an unusually high number of ground squirrel carcasses present. No nontarget carcasses were found on any of the treated areas.

Average residual kernel counts were high, reflecting poor bait acceptance. Although much more residual bait was found on the scattered baited plots, considerable amounts of bait placed down the burrows were dug back out and exposed on the ground surface by the ground squirrels. This exposed bait would have been as accessible to nontarget species as the scattered bait. Nearly half of the bait applied on the surface was present 72 hours post treatment (1 calibrated dipper contains an average of 205 kernels).

CONCLUSIONS

Under the conditions present during this study, there was no advantage in using down-the-burrow baiting compared to the traditional method of scattering bait on the ground surface near burrow entrances. Burrow baiting was less efficacious, required more time, did not reduce numbers of ground squirrel carcasses on the ground surface and still exposed bait to nontarget species. Efficacy was poor and variable during this study and more field data may be needed to adequately compare the bait application methods.

LITERATURE CITED

Marsh, R.E. 1967. A Guide for Aerial Baiting of Ground Squirrels. Third Vertebrate Pest Control Conference, March 1966, San Francisco, California. 25 pp.

Matschke, G.H., K.A. Fagerstone, P.L. Hegdal, D.L. Otis. 1979. Population Control of Richardson's Ground Squirrels Using a 2% Zinc Phosphide Bait. U.S. Fish and Wildlife Service, Denver Wildlife Research Center, Mammal Damage Control, Denver, Colorado. 25 pp.

Tietjen, Howard P. 1976. Zinc phosphide - Its Development as a Control Agent for Black-tailed Prairie Dogs. U.S. Fish and Wildlife Service, Special Scientific Report - Wildlife No. 195, Washington, D.C. 14 pp.

U.S. Environmental Protection Agency. 1980. Strychnine Position Document Number 2/3. Office of Pesticide and Toxic Substances, Washington D.C. 102 pp.